

## ABSTRACT

An external gain system includes a gain source, a laser coupler, one or more mode converters, a high index contrast waveguide, and a filter structure fabricated on either high or low index contrast waveguides. The filter structure defines the external cavity with the front facet of the laser diode. An external cavity laser is further integrated with one or more functional blocks to perform a specific function. A multiplexer is integrated with the external cavity laser array, where the waveguide ends of the external cavity serve as an input to the multiplexer, to form an integrated WDM transmitter. The output of the transmitter, if fabricated on high index contrast waveguide, is then coupled to a low index waveguide or fiber matched waveguide by using a mode converter. The gain system can be configured to become a linear optical amplifier and can also be configured as a low cost wavelength converter.